

The Mescalero Apache Nation is not ready to surrender to opponents seeking to prevent it from allowing construction of a spent fuel monitored retrievable storage (MRS) facility on its New Mexico land. If Congress permanently cuts off funds for grant money to proceed with site characterization, the Mescaleros are considering negotiations with private utilities, a tribal spokesman told NWN.

In 1991, Mescalero President, Wendell Chino, approached Gov. Bruce King (D) with a proposal to host the nation's first MRS. Chino's actions were backed by tribal officials who were optimistic that their decision would result in a lucrative economic venture while also providing the U.S. government with a much-needed interim spent fuel storage facility. The Mescaleros' proposal came in response to a plea from the federal Nuclear Waste Negotiator for states or tribes to explore hosting the site.

"The Indian Tribes stepped forward (with a proposal to host the MRS) and everyone dove under the bed," said Hudson Miller, director of public information for the Mescaleros.

Arguing that a temporary MRS might become permanent and that the state had borne its share of nuclear facilities (including the Waste Isolation Pilot Projects and the Department of Energy's Sandia and Los Alamos national laboratories), the New Mexican congressional delegation strongly opposed the Mescaleros' proposal.

State Politicians Sought To Block MRS

Furthermore, the delegation quickly sought ways to end-run the tribal proposal - ways that ultimately led to an amendment to the fiscal year 1994 Energy and Water Appropriations Bill last fall. The amendment, offered by Sen. Jeff Bingaman (D-N.M.), blocked allocation of funds for further MRS feasibility studies under a federal grant process.

Currently, three other tribes besides the Mescaleros have offered to host the MRS facility: the Skull Valley Band of Goshutes in Utah, the Fort McDermitt Shoshone Paiutes in Nevada and Oregon and the Tankawa in Oklahoma.

The Skull Valley Band of Goshutes has been pursuing the MRS almost as long as the Mescaleros, said Danny Quintana, general counsel for the Utah tribe.

The Goshutes also believe the facility would be economically beneficial and would not only be a windfall for the tribe but also for Tooele County, which faces the threat of hardship from a local military base closure. The Skull Valley reservation's proximity to Yucca Mountain makes it an attractive candidate as a true interim storage facility, Quintana said.

While the New Mexico delegation appears confident the issue is dead, the federal Nuclear Waste Negotiator's office appears more optimistic. MRS talks with the Mescaleros will go forward, said Vern Nelson, a spokesman for the negotiator's office.

Although Congress cut off funding for this fiscal year for Phase II-B grants, which would have provided \$1.8 million for site feasibility studies, geologic analyses and public outreach programs, "there are other funding options being examined," Nelson said. He declined to say just what other options were being considered.

That optimism was echoed by the Mescaleros. They are now considering private negotiations with utilities companies, Hudson said, adding that he is convinced that, if the tribe can garner the support of a "major utility player," the rest of the utilities, "will be lined up out the door," in an attempt to broker the deal.

The economic benefits to be gained from a private enterprise with the utilities do not appear to be as lucrative for the tribe as a federal agreement, Hudson said. Utilities, he argues, are apt to be very cost and profit-conscious.

Nevertheless, as long as the Mescaleros are recognized as a sovereign nation, they intend to pursue the MRS facility with, or without, the support of the district, the state or Congress, Hudson said. The Mescaleros' fundamental right to act as a sovereign nation may fare much better at this point, in partnership with the private sector, he concluded.

As for New Mexico's politicians, Hudson suggested they have chosen to make the Mescalero proposal controversial because "they think they're going to get political mileage out of opposing this." He dubbed congressional opposition a "NIMTOO (not-in-my-term-of-office) problem." Mescalero tribal leaders are baffled by the apparent hypocrisy of "a state that has received millions of dollars for nuclear technology but has suddenly pulled the rug out from under us," Hudson concluded.

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Record -86

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02212376 NRC Denies New Jersey Petition To Halt Shoreham SF Shipments Nuclear Waste News January 6, 1994 V. 14 NO. 1 ISSN: 0276-2897 WORD COUNT: 281

The director of the Nuclear Regulatory Commission's Office of Nuclear Materials Safety and Safeguards Dec. 23 denied a New Jersey petition that would have delayed removal of spent fuel from the shut down Shoreham nuclear power plant in New York.

Acting New Jersey Attorney General Fred DeVesa Oct. 8 petitioned (Docket Nos. 50-352, 50-353, and 50-322) that NRC:

Amend Long Island Power Authority's (LIPA) decommissioning plan to specifically address the transfer and transport of LIPA's fuel to Philadelphia Electric Co. (PECo);

Perform an Environmental Assessment of the risks associated with the proposed transport of the fuel by barge along and through New Jersey's coastal zone;

Consider alternative means of transporting the fuel from LIPA to PECO; and

Immediately stay PECO's June 23, 1993, license amendments; the Certificate of Compliance issued to Pacific Nuclear for the IF-300 spent fuel transport cask; and LIPA's license to transfer the fuel.

N.J. Charged Improper Procedure

The New Jersey petition alleged that NRC had violated the National Environmental Policy Act, the Coastal Zone Management Act and the Atomic Energy Act by allowing the transport of the LIPA fuel to proceed without any consideration of the potential affects on the coastal zone of New Jersey.

In a related action (Docket 50-322), NRC is considering a petition from LIPA excepting the utility from certain on-site property insurance requirements at Shoreham.

The requirements (10 CFR 50.54) are appropriate for an operating nuclear plant, but not needed for a defueled plant that is being dismantled, Shoreham maintains.

% The two-page Federal Register notice of NRC's decision on the New Jersey petition is available from BPI DocuDial, #0912. The two-page notice on insurance exemption petition is available as No. 0913.

Record -87

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02204293 Radiation Transportation Incidents Tracked; No Serious Releases Found Nuclear Waste News December 16, 1993 V. 13 NO. 49 ISSN: 0276-2897 WORD COUNT: 448

Between 1971 and 1992, 1,566 radioactive materials transportation incidents have been reported to the Department of Transportation and the Nuclear Regulatory Commission, said Jim McClure of Sandia National Laboratory. Only a small fraction of these incidents involved releases of radioactive materials, and none of the releases involved Type B packages used for higher activity, longer-lived radioactive materials.

Sandia researchers collect information on reported incidents and compile this information in the Radioactive Materials Incident Report (RMIR) database.

Database Has Evolved

"Since its development in 1981, the RMIR database has evolved to become one of the most comprehensive compilations of information on transportation accidents and incidents involving radioactive materials," McClure said. In addition to reports from DOT and NRC, the database contains information obtained from state radiation control offices, the DOE Unusual Occurrence Report database and the popular media.

The 1,566 incidents break down into 341 transportation accidents; 254 materials handling accidents; and 971 transportation incidents.

McClure points out that most radioactive materials are transported on the highway. Highway shipments include industrial gauges, radioactive material used in or as a result of the nuclear fuel cycle, low-level radioactive materials or wastes, and teletherapy sources.

Air shipments are generally isotopes with short half-lives that are being shipped more than 500 miles from the shipper's location. A courier service generally picks up shipments from the destination airport and delivers them to consignees.

209 Packages Leaked

In the years under consideration, 209 of the 4,823 radioactive material packages involved in transportation accidents released their contents. Ninety-six percent of the packages (4,614) survived the accident with no releases. The packages that released their contents were either "strong and tight" industrial packages, or Type A radioactive material packages, neither of which are specially designed to withstand accident conditions.

Of the 1,335 "strong and tight" packages involved in accidents, only 67 released their contents. Of the 3,402 Type A packages, only 142 released their contents. None of the Type B packages involved in accidents released any radioactive materials. Eighty-six Type B packages were involved in 54 accidents. Seven of the accidents involving Type B packages involved spent nuclear fuel (three during rail transport and four during highway transport).

The only accident that caused more than trivial damage to a spent fuel cask took place Dec. 8, 1971, in Tennessee, McClure said. The truck carrying the cask rolled over and the cask broke free of the trailer. Radiation survey at the accident scene indicated the structural integrity of the cask was intact and none of its contents were released.

% Copies of a RMIR summary provided to the National Conference of State Legislatures, 7 pp., is available through BPI DocuDial, # 0879.

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Record -88

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02203786 Scottish Nuclear Opts For Dry SF Storage Nuclear Waste News November 11, 1993 V. 13 NO. 44 ISSN: 0276-2897

WORD COUNT: 749

By Judith Perera

Following a public enquiry at the beginning of 1994, Scottish Nuclear (SN) expects to receive permission from the Secretary of State for Scotland and the Nuclear Installations Inspectorate to go ahead with its plans to build a ground level dry storage for spent nuclear fuel at its Torness nuclear power station (two Advanced Gas Reactors, or AGRs).

The first phase of the dry storage project will hold 5,760 fuel elements from AGR reactors, but ultimately capacity will be increased fivefold.

Scottish Nuclear has commissioned a feasibility study from GEC Alsthom. When consent is received for construction of the facility, the utility will apply to build a similar storage facility for the Hunterston B nuclear plant (which also contains two AGRs).

Costs Were Prime Factor

The decision to store spent fuel rather than reprocess was taken to cut costs. Reprocessing accounts for 20 per cent of Scottish Nuclear's total operating costs. Storage is expected to result in a saving of GBP45 million (\$67.5 million) a year.

Four types of storage were considered initially: dry vaults, metal casks, concrete containers and ponds. When assessed according to cost, technical factors, risks to the public and operators, environmental impact and perceived public concerns, vault storage emerged as a "clear leader," said Scottish Nuclear's Ian Cathro.

Another advantage is that dry storage can "be designed in modular form with the facility to retrieve fuel at any time for disposal, post irradiation examination or for reprocessing if economic or other factors changed," Cathro said.

The first phase will comprise four vaults, each incorporating a matrix of 10 by 18 storage tubes within a reinforced concrete vault. Each tube can be loaded with up to eight elements. Fuel will be taken to storage in standard water-filled transfer flasks on a road transporter. The flask will be lifted by crane onto a transfer bogie and taken to the lid unbolting station. Once the lid is loosened, the flask will be taken to the fuel drying and unloading cave where the lid will be removed and fuel elements taken out.

The graphite sleeve will be dried with a radio frequency induction heater, which increases the temperature of the graphite without heating the fuel. Studies are underway to find the best time, frequency and power requirements for this.

The charge hall will be located over the vaults and equipped with a fuel handling machine which can be moved on rails and a gantry. The roof and three sides of the hall will be clad steel and the fourth side will be the concrete vault outlet stacks.

The floor of the hall will have 50mm hexagonal plates covering the tops of the fuel storage tubes. This will be above the 1.5m shielding incorporated in the steel and concrete charge face structure.

The fuel handling machine, when loaded, will move so that it is positioned over the storage tube. After loading, the tube will be sealed with a specially designed plug. It will then be evacuated and refilled with argon gas. The vaults will be cooled by natural convection with the warm air leaving through a special outlet chimney.

Each storage tube will be connected by pipes to an inert gas source. The pipework also will provide the route for continuous monitoring of gas pressure. To protect the storage tubes from corrosion they will be sprayed with aluminium.

Scottish Nuclear plans to seal the tubes with a high-temperature silicon resin paint, subject to further development work. The internal surface of the tubes will not be treated, but will be in contact with the dry inert atmosphere that should protect against corrosion.

Damaged Fuel Can Be Handled

The dry storage facility also will be able to accommodate damaged fuel placed in special stainless steel bottles before being placed in the cooling pond.

Scottish Nuclear hopes the first storage facility will be constructed and commissioned by the end of 1995. Until then, spent fuel is to be sent to Sellafield for reprocessing. Already 660 metric tons of spent

AGR fuel from Scotland is awaiting reprocessing at Sellafield's new THORP plant and Scottish Nuclear has contracts to send a further 330 metric tons there.

Although the company is confident that the store will be built within the planned schedule, timing will depend on how quickly the government makes its final decision. Two factors are likely to cause delays - the impending decision on the future of the THORP reprocessing plant and an imminent government review of the nuclear industry.

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Record -89

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02203774 Institute of Nuclear Materials Management Nuclear Waste News November 11, 1993 V. 13 NO. 44 ISSN: 0276-2897
WORD COUNT: 85

will hold its annual Spent Fuel Management Seminar Jan. 26-28 in Washington, D.C. The agenda includes DOE's spent fuel management programs, storage, multi -purpose canister concepts, burnup credits, and special considerations. For technical information, contact: Michael White, Secretary, INMM Waste Management Division, E.R. Johnson Associates Inc., 9302 Lee Highway, Suite 700, Fairfax, VA 22031, (703) 359-9355, fax: (703) 359-0842. For attendance information, contact: Barbara Scott, Institute of Nuclear Material Management, 60 Revere Drive, Suite 500, Northbrook, IL 60062, (708) 480-9573, fax: (708) 480-9080.

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Record -90

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02191889 SF Canister Study Should Proceed;
Ratepayers Need A Voice: NARUC Nuclear Waste News December 2, 1993 V. 13 NO. 47 ISSN:
0276-2897 WORD COUNT: 204

The nation's utility regulators have called on the Department of Energy to complete its study of the multipurpose canister (MPC) system for spent nuclear fuel as "thoroughly and expeditiously as possible," and to include the National Association of Regulatory Utility Commissioners (NARUC) in the decision-making process, "especially with respect to funding and cost containment."

A resolution adopted Nov. 17 at NARUC's 105th Annual Convention in New York City noted use of MPCs in the nuclear waste disposal process potentially offers many advantages, but the benefits, "with respect to system costs decline the longer it is delayed."

Furthermore, "the cost of the MPC system, if paid out of the nuclear waste fund, has implications for the funding of repository characterization," the resolution said, adding that the ultimate objective of the waste program is deep geological disposal.

The interest of ratepayers, who have already paid more than \$7 billion into the nuclear waste fund, "must be considered in any critical decision regarding the MPC system, especially with respect to funding and cost."

Contact: National Association of Regulatory Utility Commissioners, 1102 I.C.C. Building, P.O. Box 684, Washington, DC 20044-0684, (202) 898-2200. % Copies of the resolution, 2 pp., are available through BPI DocuDial, No. 0833.

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Long-term options for using fusion or fusion-derived technologies to transmute nuclear waste into shorter lived or less harmful radionuclides will be among the topics at a major fusion conference to be held at Oak Ridge National Laboratory in Tennessee next week. The theme of the 1993 Fusion Power Associates (FPA) annual meeting is "Near-Term Applications of Fusion and Plasma Technologies." In the near term, the main waste-management application of fusion is the use of the plasma torch and plasma arc technologies to destroy chemically hazardous wastes, FPA President Stephen Dean told NWN. Westinghouse Corp., for example, has been using the plasma torch for waste destruction for at least four or five years, he pointed out. However, over the longer term, accelerator-driven transmutation of nuclear waste or use of actual fusion reactors to transmute wastes could become more attractive. We should know in about a decade, Dean concluded. Right now, the concepts are still at the laboratory scale, with Los Alamos National Laboratory being the main center for U.S. research. Bob Jameson from Los Alamos will be among the featured speakers at the Oct. 5-7 meeting.

KAZAKHSTAN represents a huge market for nuclear remediation; the question is, who will foot the bill. Kazakhstan President Nursultan Nazar-bayev called for an international commission on the socio-ecological aftermath of Soviet weapons testing. Addressing the First International Anti-Nuclear Congress in Alma-Ata last month, he suggested the first step should be a register of "test victims" under the auspices of the World Health Organization. The Kazakhstan government is investigating compensation for those affected by Soviet weapons testing, an impossible task without international aid, Nazarbayev said. Even more international aid is needed to manage the nuclear waste from the tests. "I regard the fact that Kazakhstan has been left alone to face the problems of nuclear testing on its territory as totally unfair politically and psychologically," he said. Waste Costs Are A Major Uncertainty In Decommissioning Cost Estimates

Availability and cost of radioactive waste disposal is possibly the major uncertainty in determining both the ultimate cost of decommissioning nuclear power reactors and the adequacy of decommissioning financing in cases of early retirement or rapid cost escalation, the congressional Office of Technology Assessment concluded in a Sept. 29 report.

Since 1989, six nuclear power plants have closed before the end of their 40-year licensed operating life. Owners of an increasing number of plants are examining the economics of continued operation versus the economics of early shutdown in the face of an increasingly competitive electric utility industry, OTA said. Each early retirement decision will be made individually, OTA stresses in Aging Nuclear Power Plants: Managing Plant Life and Decommissioning. Counterbalancing economic incentives to early shutdown are recent studies showing average nuclear power plant operating and maintenance costs have decreased in recent years and performance Records have been very good.

New Technology Not Required

Operating nuclear power plants are generally larger and more contaminated than the plants decommissioned to date. However, experience suggests decommissioning can be performed with existing technologies, OTA concluded. Final decommissioning of all but very special cases will likely not be performed before early in the next century.

Decommissioning will produce low-level radioactive waste (LLW), low-level mixed radioactive-hazardous waste and high-level waste (HLW). LLW represents 99 percent of the waste volume, but only 0.1 percent of the radioactivity. Spent fuel, the only form of HLW in the commercial nuclear power industry, represents less than 1 percent of the volume, but more than 99.9 percent of the total radioactivity.

Waste disposal is a major portion of expected decommissioning costs, OTA found. The estimated cost of shipping and disposing LLW is more than one-third of the total estimated cost of DECON (immediate dismantlement) decommissioning for a 1,100-MW light water reactor.

The Nuclear Regulatory Commission estimates a 1,100-MW light water reactor that has operated for its full 40-year license life will generate 18,000 cubic meters (636,000 cubic feet) of LLW. About 98 percent of this is Class A, the least radioactive form of LLW.

Large Quantities of LLW

Decommissioning a large commercial power plant may generate more LLW than the plant generated during its operating life. LLW generation has been decreasing steadily for more than a decade. Averaging waste generation over the years 1980 to 1990 shows that U.S. PWRs (pressurized water reactors) generated 336 cubic meters of waste annually and BWRs (boiling water reactors) generated 666 cubic meters. Recent years' figures have been much lower than the average.

DECON decommissioning will generate at least 50 percent more LLW than was generated during the plant's operating life. "Of course, LLW volume reduction during decommissioning may substantially lower the expected amounts of disposed waste, but the development of residual radioactivity standards more stringent than current regulatory criteria would have the opposite effect," OTA said.

Less Waste with Delayed Dismantling

Waiting as much as 50 years to dismantle a reactor is expected to reduce final LLW volumes substantially - 90 percent for both PWRs and BWRs. Shorter waiting periods will have less of an effect. LLW volumes are virtually unchanged when a 30-year storage period is assumed. For both PWRs and BWRs, 30 years of storage would allow a large portion of the Class B waste to decay to Class A status, but the volumes of Classes C and GTCC (Greater-Than-Class-C) would remain the same.

Under NRC rules, Classes A, B and C may be disposed by shallow-land burial, although packaging, transport and disposal requirements are progressively more stringent.

Other disposal technologies such as reinforced vaults, modular concrete canisters and concrete bunkers, are available, but increase disposal costs. GTCC must be disposed of by the federal government in a geologic repository.

The future amounts of LLW fees and possible surcharges are two important uncertainties in projecting decommissioning costs. Currently, the minimum disposal charge at the Barnwell, S.C., disposal site is \$270 per cubic foot for generators outside of the Southeast Compact. Rates at new disposal sites are projected at \$200 to \$300 per cubic foot.

The OTA report was requested by the Senate Governmental Affairs Committee and the House Energy and Commerce Committee and its Energy and Power Subcommittee. *Aging Nuclear Power Plants: Managing Plant Life and Decommissioning*, 183 pages, is available for \$11 from: Superintendent of Documents, U.S. Government Printing Office, P.O. Box 3719, Pittsburgh, PA. 15250-7954, (202) 783-3238, GPO Number 052-003-01342-8.

Record -92

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02061212 NRC Approves TN-40 Cask For
Prairie Island Fuel Nuclear Waste News October 28, 1993 V. 13 NO. 42 ISSN: 0276-2897
WORD COUNT: 269

Northern States Power (NSP) received a license from the Nuclear Regulatory Commission Oct. 25 allowing the utility to store spent fuel from Prairie Island nuclear power plant near Red Wing, Minn., in an independent spent fuel storage installation (ISFSI). Approval was given for the installation to use up to 48 TN-40 dry storage casks designed and supplied by Transnuclear Inc.

The TN-40 cask is a second-generation metal storage cask that can hold 40 pressurized water reactor fuel assemblies with the older 14x14 fuel pin array used by the Prairie Island plant.

The license allows NSP to use the TN-40 to store SF cooled for 10 years or longer, with an initial enrichment up to 3.85 percent and a maximum burnup of less than 45,000 MWD/MTU.

The license allows Northern States to store fuel in the ISFSI for 20 years. The utility also can request a license renewal allowing longer storage.

SF Cask License Application: Pacific Nuclear (PN) submitted the safety analysis report for the NUHOMS-MP187 Multi-Purpose Cask and Canister to the Transportation Branch of the Nuclear Regulatory Commission. The company seeks a Certificate of Compliance under 10 CFR 71 which would allow use of the cask for unrestricted rail or barge transport of 24 pressurized water reactor fuel assemblies. A separate 10 CFR 72 license application is being submitted to NRC's Storage Branch by the Sacramento Municipal Utility District (SMUD) for use of the MP-187 as part of a stand-alone dry storage system at the Rancho Seco nuclear power plant, now being decommissioned. PN expects to begin fabrication of casks for Rancho Seco in early 1994. SMUD expects to begin loading fuel in 1995.

Record -93

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02061209 EC Commission Outlines Radwaste Progress, Plans and Priorities Nuclear Waste News October 28, 1993 V. 13 NO. 42 ISSN: 0276-2897 WORD COUNT: 1061

The study, selection and opening of radioactive waste disposal sites are priorities and must be continued in the European Community (EC), the EC Commission recommended to the Council of Ministers in its third report on radioactive waste management in Europe.

The evaluation of waste generation has been extended to 2020.

The report updates and supplements information presented in the two previous reports (1983 and 1987) and, for the first time, provides information on the new states of the Federal Republic of Germany.

The commission's report is based on information from national sources supplied by member states' delegates on the commission's Advisory Committee for the Community Plan of Action in the field of radioactive waste. General Issues

During the last decade, all forms of waste management from household waste to spent nuclear fuel have been subjected to increasing attention and concern in Europe.

The EC countries produce some 80,000 cubic meters of radioactive waste each year, of which 150 cubic meters are highly radioactive.

Increased awareness by both professionals and the public at large has focused attention on a number of new aspects of radioactive waste management, including:

the need for waste minimization, in terms of volume, radioactivity and chemical toxicity, which calls for optimal management procedures;

rules for transportation and international transfer of radioactive waste;

recycling and disposal of waste from dismantling old nuclear facilities (more than 100 major nuclear facilities have been closed around the world and more will close as existing plants reach the end of their operating lives);

management and disposal of radioactive waste arising outside the nuclear fuel cycle and resulting from research, industrial and medical activities involving use of radionuclides;

restoration of radioactively contaminated sites.

Sources of Radioactive Waste

All EC member states produce radioactive waste from non-energy, non-weapons activities such as industrial applications, medicine and research activities. These wastes are mostly low-level and very-short lived, with the exception of spent sealed radiation sources that can be highly active and long-lived.

The commission report points out data on these non-power wastes are not easily comparable from one country to another, even within the EC countries. However, the report uses a rough estimate of 10- 15 cubic meters per million inhabitants per year.

Wastes resulting from uranium milling and mining contain low concentrations of natural radionuclides, some of which are long- lived. Uranium extraction and processing, however, is not common in the EC countries. It has been limited to France, Spain, Portugal and the Federal Republic of Germany.

Waste from nuclear power production is roughly proportional to the nuclear electricity production capacity. The installed capacity in the EC reached 111.8 gigawatts-electric (GWe) in 1990. Only 1.8 GWe were attributed to the addition of the East German plants.

For comparison, the commission used an estimated EC total of 77.5 GWe (1985) to derive waste estimates in its 1987 report. Most of the increase is due to new French and German plants, and, to a smaller degree, to new British and Spanish plants. Italian power plants stopped operations in 1987.

More than 80 percent, by volume, of the cumulative radioactive waste from nuclear power production in EC countries is comprised of low-level waste (LLW) that has already been permanently disposed, mainly by near-

surface disposal. By the end of 1991, France had disposed of 464,500 cubic meters of low- and medium- level waste at the Centre de la Manche. The United Kingdom had disposed of 775,000 cubic meters at Drigg and 14,000 cubic meters at Dounreay.

The former Democratic Republic of Germany disposed of 14,300 cubic meters of mostly LLW (part of this was liquid LLW disposed of by in-

situ solidification) in the salt mine of Morsleben and of 5,800 encapsulated radioactive sources from 1978 through 1990.

Given uncertainties regarding the future of nuclear power, the commission arbitrarily assumed the present generation of plants will operate until the end of their technological life of 30 years.

These assumptions resulted in an estimate for the total production rate of conditioned low-level, medium-level and alpha waste of about 80,000 cubic meters per year for the EC as whole until the end of the century.

The commission expects the total volume of waste to decrease slowly after 2000; however, the report adds that volumes may increase sharply after 1995-2000 from plant decommissioning.

Alpha waste accounts for about 8 percent of the total, with medium- and low-level waste making up the rest.

Almost all the radioactivity in nuclear power plant waste is concentrated in spent fuel. EC countries produce about 3,400 metric tons of heavy metal (MTHM) per year, which will decrease to about 3,000 MTHM by 2000 as a result of the slowing down of nuclear power programs.

A major part of the spent fuel will be reprocessed during the present decade, producing several hundred cubic meters per year of vitrified high-level waste.

Research and Development

Important radioactive waste research and development programs are being carried out at national and EC levels. The commission regards the safety of radioactive waste management and disposal as a given at this time; therefore, most R&D is oriented toward optimizing technologies and validating the deep underground disposal concept.

The EC emphasized the following topics: minimization of waste volumes to be disposed, especially those containing long-lived radionuclides (alpha waste);

reduction of radioactive releases into the environment to levels below existing discharge limits; and

development of deep underground repositories and disposal safety.

Some EC research programs have been started recently to examine the technical feasibility and implications of developing an advanced radioactive waste management strategy, e.g. the possibility of transmuting long-lived radionuclides into short-lived ones.

Deep Disposal

EC regulations provide common guidelines and requirements from which most national guidelines are derived, particularly those concerning radiation protection. "However, policies and strategies for carrying out the management of radioactive waste are matters of national competence, as are the ways and means of ensuring technological safety," the report points out.

The EC countries are looking to geologic formations (e.g. clay, salt and granite) that have proved to be stable for several millions of years as the host media for underground disposal.

EC and its member countries are conducting safety assessments involving analyses of the possible future behavior of the overall waste disposal system and its potential impacts on humans and the environment.

The report of the communication of the EC Commission to the Council on the Present Situation and Prospects for Radioactive Waste Management in the Community, COM(93) 88 final, catalogue number CB-CO-93-109-EN-C, may be ordered from: Office for Official Publications of the European Community, L-2985, Luxembourg.

% A six-page summary of the commission report is available from BPI DocuDial, #0661.

Record -94

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02059506 German Auditor General Questions Economics of SF Reprocessing By Robert

McDonald Nuclear Waste News October 21, 1993 V. 13 NO. 41 ISSN: 0276-2897
WORD COUNT: 563

The German Auditor General's office has questioned the economic viability of reprocessing nuclear fuel, thus raising a further question about the future of British Nuclear Fuel's Thermal Oxide Reprocessing Plant (THORP).

Start of operations at THORP has been delayed pending the outcome of an inquiry into whether it will generate enough income to offset its construction and decommissioning costs.

The plant was constructed using cost-plus contracts from clients. Cancellations would carry heavy penalties, though contract terms have not been revealed for reasons of commercial confidentiality. BNF says it would not be liable for cash penalties, but the country would lose income and, more importantly, credibility as a site for foreign investment, if THORP fails to open.

Waste Disposal Must Be Demonstrated

German law requires nuclear operators to demonstrate that they can dispose of waste over a period of six years. The BNF contracts were used to secure certificates of compliance for German utilities. The law also requires research into permanent storage as opposed to reuse.

The Auditor General's report said: "According to recent cost estimates, reprocessing has now become more than twice as expensive as direct, permanent storage of reprocessable residues.

"In the view of the Auditor General's office, reprocessing can therefore no longer be economically justified and direct permanent storage is therefore allowed by the law on atomic energy."

BNF: German Contracts Still Firm

BNF said its contracts with German utilities remain firm and that it has letters of confirmation from two of them. A third recently wrote to the British Environment Minister urging him to authorize the startup of THORP as soon as possible.

The German auditor's report was "merely an opinion," which was contradicted by others such as a recent Organization for Economic Cooperation and Development (OECD) report which said that disposal of reprocessed waste is cheaper than spent fuel disposal (NWN, Sept. 16, p. 357), a BNF spokesperson was reported as saying.

"The message is clear - there are significant uncertainties when comparing the known and understood costs of an existing technology - reprocessing - with uncertain and difficult-to-quantify costs of a technology which has yet to be developed and proven, i.e. direct disposal," the spokesperson was reported as saying.

BNF has orders to reprocess 6,705 tons of spent fuel during its first decade of operation. The company estimates profits of \$900 million on revenues of \$13.5 billion.

The German contracts cover 969 tons of fuel. Germany's withdrawal would put a significant brake on the economic justification for the plant.

Second Decade Operations

More importantly, BNF is hoping to operate the plant for a second decade. It is reported to have contracts totalling 3,450 tons - about half of its total capacity - of which 1,600 tons would come from Germany. If these were cancelled, the viability of the plant in its second decade would be challenged severely.

Orders on Record for the first decade of operation are: Japan (2,673 tons); Britain (2,158 tons); Germany (969 tons); Switzerland (422 tons); Spain (145 tons); Italy (143 tons); Sweden (140 tons); Netherlands (53 tons); and Canada (2 tons).

According to news reports, the two UK customers, Nuclear Electric and Scottish Nuclear, whose contracts are valued at some \$22.5 billion, have been pressing for a 20 percent reduction in charges.

The Irish government, which is opposed to the plant on the grounds of pollution, has submitted a report as part of the consultation exercise, claiming that dry storage of UK spent fuel would be \$1.35 billion cheaper than reprocessing.

Record -95

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02059502 Swedish Repository Decision
Expected By End Of The Year By Judith Perera Nuclear Waste News October 21, 1993 V. 13 NO.
41 ISSN: 0276-2897 WORD COUNT: 403

Swedish reactor owners, who are responsible for waste management, have decided to build a final repository for spent fuel through the Swedish Nuclear Fuel and Management Company (SKB). The authorities have accepted in principle SKB's plans for this facility and government approval is expected before the end of the year.

Detailed investigations of two potential sites are expected to begin in 1995, said SKB President Sten Bjurström. SKB has started discussions with several municipalities on the possibility of preliminary studies to assess site suitability.

Sweden abandoned the reprocessing option in 1980 after a referendum rejected building any more reactors than the existing 12 in operation.

SF Stored for 40 Years

Spent fuel now is stored at an interim facility, CLAB, near the Oskarhamn nuclear power plant. CLAB began operation in 1988 and now contains 1,800 metric tons of spent fuel. Eight thousand metric tons of spent fuel will be generated by 2010.

CLAB is designed to keep fuel for 40 years to allow residual heat and radioactivity to decay by a factor of 10, making subsequent handling and disposal easier. A spent fuel encapsulation plant will be built on the CLAB site.

A final repository for low- and intermediate-level wastes, SFR, was built near Sweden's Forsmark nuclear power plant. SFR also will handle future wastes from decommissioning and dismantling reactors. Sweden transports spent fuel and radioactive wastes mainly by sea, using special containers and a purpose-built ship.

The repository proposal calls for multibarrier protection. It will be 500 meters deep in granite bedrock. Spent fuel will be encapsulated in special canisters, which will be deposited in holes drilled in the granite. Bentonite backfill will provide a mechanical and chemical barrier.

Fuel canisters, with a design life of 1,000 years, will be made from thick composite copper. They will have a dual role, to aid handling and to provide protection in the repository.

The repository will be built in stages. The first step will be a small repository for a limited amount of fuel. The small-scale facility will be used to test all aspects of operation, including encapsulation. Results will be evaluated before a full-scale repository is built.

Construction of the encapsulation plant is not likely to begin before 1998 and construction of the small-scale repository will not begin before 2004. First-stage operation and evaluation of the encapsulation plant is expected around 2006 and of the repository around 2008. Second stage operation of both will not begin until 2020. Final repository closure is expected around 2050.

Record -96

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02059489 STORED SPEND FUEL Nuclear
Waste News October 14, 1993 V. 13 NO. 40 ISSN: 0276-2897 WORD COUNT: 46

About 150,000 metric tons of heavy metal equivalent of spent nuclear fuel will be in storage around the world by 2000, three staff members from the International Atomic Energy Agency's Nuclear Fuel Cycle and Waste Management Division said in an article in the most recent IAEA Bulletin.

Record -97

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02039048 FINLAND BEGINS SITE SELECTION FOR FINAL SPENT FUEL REPOSITORY By Judith

Perera Nuclear Waste News October 07, 1993 V. 13 NO. 39 ISSN: 0276-2897 WORD COUNT: 487

The Finnish nuclear power plant operator Teollisuuden Voima Oy (TVO) has selected three possible sites for a final spent fuel repository - Kuhmo in the east, Aankoski in the center and Eurajoki in the west.

Eurajoki is seen as having a certain advantage in that it is just 2 km from TVO's Olkiluoto nuclear power station, meaning transportation problems would be minimized. The situation, however, has been somewhat complicated by the villagers of Kannonkoski in central Finland, who have offered their area for a repository. The 2,000-strong community sees it as a source of income and employment for the village which is facing 30 percent unemployment.

The preliminary site selection is in line with a 1983 government decision that approved in principle the construction of a repository rather than opting for fuel reprocessing. According to General Manager Magnus Von Bonsdorff, TVO considered the possibility of reprocessing but found it too expensive.

TVO operates two 710-MW reactors that, over their 40-year life, will produce 1,840 metric tons of spent fuel. Interim storage is at a special on-site facility, which began operating in 1987. The facility contains fuel accumulated over the first 10 years of the plant's operation. Fuel for Finland's other nuclear plant at Loviisa, which has two Soviet-built reactors, is provided by Russia and returned there for reprocessing and storage. TVO plans to undertake detailed investigations of the shortlisted sites by 2000 and will apply for a construction permit in 2010. It will begin operating by 2020.

Spent fuel will be encapsulated in special metal canisters and deposited in holes bored into the floor of disposal tunnels drilled out of bedrock hundreds of meters below ground. The canisters, designed by TVO, are made of two containers - an outer one of copper to resist corrosion and an inner one of steel for strength.

Each container will hold nine fuel assemblies and the remaining space will be filled with a granular substance such as lead shot. The lid of the steel container will be bolted down and the copper lid then will be welded to the body of the outer shell. A special encapsulation station will be built at ground level above the repository. The sealed containers will be taken down by lift.

The repository will consist of several tunnels dug some 500m down and connected by transportation tunnels. They will be reached by three shafts, one for construction, one for the wastes and the other for personnel. About 239,000 cubic meters of rock will have to be excavated.

The 42 disposal tunnels will each be 8,400 meters long, 3.3 meters wide and 4.6 meters high. They will contain a total of 1,200 boreholes 7.5 meters deep and 1.5 meters in diameter spaced several meters apart. Once a canister has been deposited, the borehole will be packed with bentonite clay. When the repository is full, the encapsulation station will be pulled down and the tunnels and shafts filled with a mixture of bentonite clay and sand.

Record -98

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02039047 FINLAND BEGINS OPERATING SECOND WASTE REPOSITORY By Judith Perera Nuclear Waste News October 07, 1993 V. 13 NO. 39 ISSN: 0276-2897 WORD COUNT: 574

Finland has begun building its second repository for permanent disposal of reactor operating wastes on the site of its nuclear power plant at Loviisa operated by Imatran Voima Oy (IVO). The first repository, the VJL facility, opened last year on the site of Finland's other nuclear power plant at Olkiluoto, which is operated by Teollisuuden Voima Oy (TVO). The two operators are each responsible for the entire operation of their plants, from procuring fuel to its final disposal.

The VJL repository, sited about 1 km from the Olkiluoto plant, will house all low- and intermediate-level waste from TVO's two 710MWe BWRs (supplied by ASEA Atom) during their 40 years of operation. It also will take intermediate wastes from operation of the site's interim spent fuel store and will be extended later to take waste from plant decommissioning and dismantling.

Construction, which cost about \$17 million, began in April 1988 and took four years. The first waste containers were deposited in May 1992. A total of 90,000 cubic meters of rock was removed to make room for 8,000 cubic meters of wastes.

The repository facilities are 70 meters to 100 meters down and comprise two separate silos for low-level and intermediate-level wastes. A 700-meter transport tunnel and lift shaft lead to the top of the silos. Separate shafts lead to the bottom of the silos. The silos are 24 millimeters in diameter and 34 meters deep. They are linked by a 65-meter hall, which houses the waste reception area and bridge crane. Each silo is capped with a concrete lid for radiation shielding supported by steel beams. The lids are 25 centimeters thick in the low-level silo and 50 centimeters in the intermediate silo, which is also concrete lined.

Wastes, which accumulate at a rate of 150-200 cubic meters a year, are packed in the power station into concrete containers, each holding 16 drums. These are then taken in a steel container by special vehicle to the repository where they are inspected for contamination and cleaned, if necessary. The vehicle takes the containers by tunnel to the hall, where they are opened. The separate waste containers are lowered into the silos by a crane, which can be operated remotely. Personnel are not allowed in the crane hall during this time.

Low-level wastes include protective plastics, tools, overalls and towels. These are compressed into 200-liter drums. Incompressible matter is packed in steel or concrete containers. Intermediate wastes include water clean-up masses, which are solidified with bitumen and cast in drums. Low-level wastes can be handled without radiation shielding, but shields are required for the intermediate wastes. A normal ventilation system keeps radon releases from the bedrock at a low level and ground water will not come into contact with the containers during the operation. Ground water is taken from the repository through drain pipes and collected in a pool, from which it is pumped to the surface.

Guidelines for post-closure safety have been formulated by the Finnish Center for Radiation and Nuclear Safety. Regulations have set 0.1 mSv/yr as the maximum allowable dose after closure for the most exposed people. Annual individual doses arising from a potential accident are limited to 5 mSv/yr. Backfilling materials will be assembled and concrete plugs constructed during closure to minimize water flow rates. The operation license of the repository runs until 2051.

The second repository at Loviisa will comprise horizontal tunnels, instead of silos, 100 meters down in granite bedrock. It should be completed and operating by 2000.

Belgium's National Agency for the Management of Radioactive Waste and Fissile Material (ONDRAF/NIRAS) may put its high and medium-level wastes in clay. Tests of suitable geological formations have been underway since the 1970s in cooperation with the Belgian Nuclear Research Center and the European Community. A suitable site for a deep repository is thought to be a clay formation extending over 100 square kilometers beneath northeastern Belgium. The layer being investigated is 90 meters thick and situated between 190 meters and 280 meters below the surface between two aquiferous sand layers.

Between 1980 and 1984 an experimental underground laboratory was excavated in frozen clay. An additional gallery was built in 1987 in unfrozen clay. This provided valuable information, according to Fred Decamps, general manager of ONDRAF/NIRAS. He said the mechanical behavior of clay was one of the main unknown factors at the start of the project. The plan is to sink at least two vertical access shafts into the chosen clay layer some 250 meters below the surface. From these, horizontal galleries will be created to accommodate waste package handling. From these, secondary galleries will be built for storing the fuel. Each type of waste will have a specific type of gallery. Once full, the galleries and shafts will be backfilled and the site restored to its original condition. ONDRAF/NIRAS will present a preliminary safety assessment of this concept before 2000. The next stage will be an underground pilot demonstration at full scale (before 2015), design and preparation (before 2025) and construction (before 2035). The repository will operate for 15 years.

Final Option

For final disposal of low-level, short-lived wastes, ONDRAF/NIRAS is considering engineered concrete structures. These would provide protection for 200 years, after which the site would be released for other uses.

In the meantime wastes will be stored in interim facilities on the surface. Belgium's wastes arise from the operation of eight reactors which provide almost 60 percent of its electricity. As well as the usual operating wastes they include reprocessing wastes from spent fuel reprocessed abroad. Belgium's nuclear fuel company, Synatom, has a contract with Cogema for the reprocessing of 630 metric tons of spent fuel.

The wastes from this will include 1,665 cubic meters of Class A low-level, short-lived waste; 151 cubic meters of Class B technological alpha in concrete containers; 30 cubic meters of Class B medium-level sludge in bitumen; 123 cubic meters of Class C high-level waste (cladding hulls and endpieces in concrete); and 85 cubic meters of Class C very-high-level waste (fission products in glass). Shipments will begin next year and continue until 2003, most of them taking place between 1997 and 2002. These will include 17 shipments of very-high-level wastes.

They will be stored in two facilities at the Dessel site of Belgoprocess - building 36 for high- and medium-level wastes (still under construction) and building 51 for low-level wastes. Construction of Building 36 began in 1990 and the first phase - storage for 100 cubic meters of very-high-level wastes - will be ready next year. Construction of phase two - space for 1,000 cubic meters of high- and medium-level wastes - began this year and will be finished by 1995. The cost of the facility has been estimated at about 2 billion Belgian francs (\$55 million).

Unique Features

Special design features of the building include resistance against extreme loads such as earthquakes, external explosions or an aircraft crash through the use of thick highly reinforced concrete walls and roof. Radiation shielding is provided by the concrete, which is between 1 meter and 1.5 meters thick. Dose rate on contact with the walls is limited to 20 microSieverts/hr. A force-filtered ventilation system with five circuits will cool the heat-generating wastes and maintain low pressurization.

Air from the ventilation system will be discharged to a stack through a filter that will reduce activity to negligible levels. Any solid or liquid waste produced during the operation will be collected and treated on site.

The building will have an emergency power supply and mobile generator as back-up. The design life of the building is 75 years, extendable up to 100 years. All waste handling will be remotely controlled except the loading machine. Mobile cranes also may be installed.

Belgium also may face the problem of disposing of unprocessed spent fuel. Present contracts do not cover all fuel that will be discharged from plants over the coming decades.

Disposal in clay may prove a problem because of the weight involved, and fuel rods may have to be cut or processed in some way. But development of this technology could not be supported by Belgium alone and would require international cooperation. Some initial steps towards studying the problem have been taken within the framework of the EC's radioactive waste management and disposal programs.

Record -100

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 02023507 OECD COMPARES
PROJECTED HLW DISPOSAL COSTS FOR 10 NATIONS By Robert

McDonald Nuclear Waste News September 16, 1993 V. 13 NO. 36 ISSN: 0276-2897
WORD COUNT: 1190

Disposal of reprocessed waste is cheaper than spent fuel disposal, said a study by the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD).

Analyzing proposed repository programs in 10 OECD countries, the study finds costs for disposing of reprocessing waste vary between \$0.5 billion and \$6.3 billion, while costs for disposing of spent fuel range between \$0.8 and \$10 billion.

When normalized in terms of electricity output, the same holds true, although the difference is less pronounced: for reprocessing waste it varies from \$0.25 to \$1.65 million per terrawatt hour (M/TWh), while for spent fuel it ranges from \$0.43 million to \$1.77 M/TWh.

Reprocessing Costs Not Considered

The figures do not, however, take into account reprocessing costs. Nor do they include the costs of site search and research, an area where national estimates vary widely. The French, for example, expect the site search and research to be equal to 8 percent of their total repository costs; the United States expects it to be 77 percent.

The OECD study, *The Cost of High Level Waste Disposal in Geological Repositories*, was an effort to bring a degree of consistency to the analysis of the cost of national radioactive waste disposal programs.

Specifics Differ Widely

The study shows the basic concept of deep tunnel and drift technology is common to all nations; however, specific designs vary widely.

Repository depths range from 300 meters in the United States to 1,200 meters in Switzerland.

The repositories are to be built in salt (Germany, Spain and the Netherlands), crystalline rock (Canada, Finland, Sweden, Switzerland and the United Kingdom), clay (Belgium) and tuff, a consolidated volcanic ash (United States). The French have not decided on a medium and the Spanish also are considering granite.

Packaging for spent fuel will include titanium, copper-steel, stainless steel, steel and pure copper. For vitrified reprocessing waste, cast or mild steel may be used.

Backfill materials include bentonite and sand, crushed rock from the excavation and, in the Belgian case, clay.

The operating life of the repository is expected to vary from 15 years (the Netherlands) to 50 years (Germany).

The wide variation in costs depends on the scale of the repositories. Since a large fraction of disposal costs are fixed, costs per unit of waste disposed decrease with the size of the system.

OECD, in an attempt to find common ground on which to assess cost factors, collated national studies and calculated estimates in July 1991 U.S. dollars. This provides a freeze frame for comparison, but says nothing about current costs that will be altered by varying rates of inflation and exchange rate parities.

Comparisons were limited to packaging and disposal in order to remove the country-specific costs of research and development and siting.

Major Variables Identified

Results show the major variables are the size of the program and savings achieved through economies of scale; fuel burnup and the size of the repository necessary to allow for residual heat dissipation; and the amounts of non-high-level waste to be disposed in the same repository.

In order to get around these variables, the report "normalizes the costs according to four criteria: cost per unit of electricity generated in millions of dollars per terrawatt hour (\$M/TWh), cost per unit by weight of wastes in thousands of dollars per ton of uranium (\$k/tU), cost per unit by volume of wastes in thousands of dollars per cubic meter (\$k/m³) and underground cost by volume of rock excavated in dollars per cubic meter (\$/m³)."

For spent fuel disposal, the United States has the cheapest costs in all categories: \$0.43M/TWh of electricity generated; 100 \$k/tU of waste by weight; 110 \$k/m³ of waste by volume; and \$420/m³ of excavated rock.

At the upper end of the range the countries vary. Finland has the highest costs in three categories: electricity generated, \$1.8M/TWh; weight of waste disposed, 410 \$k/tU; and volume of waste disposed, 290 \$k/m³. Spain and Sweden share the highest excavation costs, \$1,400/m³.

For reprocessed waste disposal, French costs are the cheapest in terms of electricity generated, 0.25 \$M/TWh; the United Kingdom's in terms of waste by weight, 25 \$k/tU; Germany's in terms of waste by volume, 96 \$k/m³; and the United Kingdom's in terms of rock excavated, \$470/m³.

At the upper end of the range, Switzerland has the highest costs in terms of electricity generated, \$1.65M/TWh and waste by weight, 350 \$k/m³; the United Kingdom has the highest costs in terms of waste by volume, \$560M/m³; and Belgium has the highest costs in terms of rock (clay) excavated, \$3,200/m³.

The usual normalization of cost per metric ton of uranium "may introduce major distortions if wastes from different reactor types are assumed," the OECD report said.

Thermal Impacts Are a Key Factor

This is particularly true with regard to the thermal impact on the repository. Magnox reactors have a very low burnup of 5,500 megawatt-days/ton of uranium (MWd/tU), whereas pressurized water reactors can be as high as 42,000 MWd/tU.

Thermal impacts also affect and are affected by before-disposal storage. Heat emission from a fuel element or high-level vitrified waste decays during the first 40 years by a factor of 10. During the next 60 years, it decays by a factor of two for spent fuel and by a factor of four for vitrified waste because of the removal of plutonium.

The greater the heat loss, the more waste can be stored in the same container or borehole. Disposal costs drop as the cooling period increases; however, storage costs rise.

A U.S. study shows delaying a repository by 50 years decreases the cost, in constant money, by 4 percent. But this is more than offset by a 53-percent increase in storage costs, which would increase the total system cost by 15 percent.

Swedish studies using different accounting methods based on present value of the costs indicate there is always a decrease in the present value of costs with longer cooling times. For example, shortening storage from 40 to 25 years would increase the present value of the cost by 20 percent, assuming a 2.5 percent interest rate.

The length of the operation of the facility also has a significant impact. A Belgian study showed that, if a repository designed to operate for 30 years was operated for only 20, the costs would be 19 percent lower. If it were operated for 40 years, the costs would be 13 percent higher, largely because of staff costs.

Total costs also are heavily dependent on the price of packaging facilities and infrastructure, such as ports and railways, to transport the waste to the site.

Overall, the OECD report concludes the cost for packaging and disposal of spent fuel and reprocessing waste will account for only a few percent of the overall fuel cycle costs. The total fuel cycle cost of light water reactors is only around 20-40 percent of the total cost of generating nuclear power.

"Therefore, quite large uncertainties in the disposal cost estimates will have only a small impact on the cost of nuclear electricity generation," the report said.

For information on purchasing *The Cost of High-Level Waste Disposal in Geological Repositories: An Analysis of Factors Affecting Cost Estimates*, Nuclear Energy Agency of the Organization for Economic Cooperation and Development, 147 pp., contact: Mail Orders, OECD, 2, rue Andre-Pascal, 75775, Paris, Cedex 16, France, telephone: (331) 45-24-8200; fax: (331) 45-24-8176.

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01972150 ACTINIDE BURNERS COULD HELP SOLVE NUCLEAR WASTE PROBLEMS, PANEL TOLD Nuclear Waste News August 12, 1993 V. 13 NO. 32 ISSN: 0276-2897 WORD COUNT: 689

A new generation of actinide-burning reactors may be the most efficient way to minimize high-level radioactive waste, control proliferation of weapons grade plutonium and produce energy as a by-product, witnesses told the Senate Energy Committee Aug. 5.

The Department of Energy's Actinide Recycle program is designed to evaluate the technical and economic feasibility of an innovative fuel cycle. The administration, in its fiscal year 1994 budget submission, combined a restructured and downsized Integral Fast Reactor program with the Light Water Reactor Actinide Recycle program at Argonne National Laboratory.

The \$21.9 million request is comprised of \$15 million for the combined program with an additional \$6.9 million to fund support facility expenses, said E.C. Brolin, acting director of the office of nuclear energy. All other nuclear energy test facilities would begin shutdown in FY 1994.

NAS Report Will Be Crucial

DOE will not request expansion of funding for the Actinide Recycle program until the National Research Council of the National Academy of Sciences (NRC/NAS) completes a comprehensive report on separation and transmutation technologies in July 1994, Brolin said. Nonproliferation, mixed waste and nuclear safety are among the issues NRC/NAS is studying.

Initially, DOE planned to shut down EBR-II (Experimental Breeder Reactor II) in FY 1994 and rely on foreign reactors for the fuel testing needed to verify the performance of actinide recycle fuel. "However, while Congress considers this plan, we are reviewing other termination options which will provide for better control and coordination of the testing to minimize overall projected net costs," Brolin said. One option would be use of the EBR-II fuel core for actinide-burning tests while it is being phased out. While the cost analysis is not complete, it appears that use of EBR for the actinide-burning tests would only add about 10 percent to the cost of shutting down the facility.

This expense must be compared to the additional costs of running actinide burn tests on a reactor outside the United States. Only France, Japan and Russia have reactors that would be suitable for the tests, Brolin said.

DOE estimates it would spend about \$13 million on foreign tests involving about 100 fuel pins, but these tests would not be sufficient for the Nuclear Regulatory Commission to use the results to license future actinide burning reactors. On the other hand, EBR-II could be used for a full-core test, about 7,500 fuel pins, which should be sufficient for NRC licensing purposes.

Fuel Design Is Critical

Fuel design is the most critical element in designing an actinide burner, Brolin said. The more fuel pins that can be tested, the lower the risk of development problems.

The main waste management advantages DOE has identified for actinide-burning are:

The removal of actinides from material in the repository will allow more compact emplacement of waste because most of the long-term heat load after 300 years would be eliminated.

Actinide recycle will allow the highly radioactive and long-lived portions of radioactive waste to be used as fuel in Advanced Liquid Metal Reactors to produce electricity.

The compact nature of the waste forms using actinide recycle means that the volume and mass of radioactive waste to be ultimately disposed will be less.

By using spent fuel as new fuel for advanced design reactors, the demand for uranium mining and milling will be reduced.

With actinide recycling, the level of radioactivity of the contents of the repository will decay to very low levels within about 300 years.

A newly completed, peer-reviewed report from Oak Ridge National Laboratory suggests that significant increases in repository loading are potentially achievable through actinide recycle, Brolin told the committee.

Witnesses also stressed the proposed actinide recycle system would not be a proliferation threat. An actinide recycle process using a metal fuel form is inherently more proliferation-resistant than conventional spent fuel reprocessing, which uses the PUREX process and an oxide fuel form.

A joint study by the departments of energy and state notes that the mixture of plutonium, uranium and other actinides obtained from the Integral Fast Reactor fuel cycle, as now conceived, cannot be used directly to produce a nuclear weapon because plutonium is never in a pure form in the process. Testimony from the Energy Committee hearing (66 pages) is available through the BPI DocuDial Service; Document Code 0360.

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01926604 CURRENT PLANS ADEQUATE FOR ALL FORESEEABLE NUCLEAR WASTE: DOE Nuclear Waste News June 24, 1993 V. 13 NO. 25 ISSN: 0276-2897 WORD COUNT: 808

The current high-level radioactive waste management program and plans are adequate for any additional volumes and categories of nuclear waste produced by new power plants and for managing the potential volumes and categories of waste expected from DOE's own program for stabilizing and disposing of weapons program waste, DOE has concluded.

DOE used three scenarios to conduct its review of waste program adequacy required by Section 803 of the Energy Policy Act of 1992. The report of its results was released June 21.

The scenarios were used to evaluate the following program aspects: the need for a second repository; interim storage of waste; waste transportation; waste acceptance; costs and funding of the program; regulatory framework of the program; and the decision to emplace defense waste and commercial waste in the same repository.

The scenarios examined were:

Reference Scenario: No new nuclear plants are licensed. Existing commercial nuclear power plants do not have their licenses renewed and are not retired early.

High-level radioactive waste in underground tanks at four sites (the West Valley Demonstration Project in New York, the Savannah River Site in South Carolina, the Idaho National Engineering Laboratory and the single and double-shell tanks at Hanford in Washington state) is solidified and stored in canisters pending disposal in a geologic repository, including 10,000 canisters from the single-shell tanks at the Hanford site.

Upper Bound Scenario: A number of nuclear power plants with advanced light-water reactors begin to operate after 2006. The spent fuel from the new advanced light-water reactors is similar to that discharged from existing pressurized-water and boiling-water reactors. In addition, the licenses of 70 percent of existing nuclear power plants are renewed for an additional 20 years.

High-level radioactive waste produced by reprocessing spent fuel at four sites is treated, placed in canisters, and stored pending disposal in a geologic repository, including 35,000 canisters from single-shell tanks at the Hanford site.

This scenario results in generation of 115,800 metric tons of spent nuclear fuel through 2030 and 48,900 canisters of solidified high-level waste.

Advanced Liquid-Metal Reactor Scenario: A number of new nuclear power plants are licensed and constructed after 2006, including 19 actinide-burning advanced liquid metal reactors deployed between 2012 and 2030. Existing light-water reactors and advanced light-water reactors also operate in this scenario. To produce fuel for the advanced liquid-metal reactors, spent nuclear fuel is reprocessed from reactors of all designs. Reprocessing consumes light-water reactor spent nuclear fuel and produces liquid high-level radioactive waste.

In addition, high-level waste produced at the four DOE sites is treated, placed in canisters and stored pending disposal in a geologic repository, including 35,000 canisters from the single-shell tanks at the Hanford site.

In this scenario, 40,900 metric tons of spent nuclear fuel are reprocessed to supply fuel for the advanced liquid-metal reactors, resulting in generation of 74,900 metric tons of spent nuclear fuel through 2030. Reprocessing results in 46,100 packages of high-level radioactive waste added to the 48,900 canisters of DOE waste in the other two scenarios, giving a total of 95,000 canisters and packages of high-level radioactive waste through 2030.

The analysis found that:

Radioactive materials from new nuclear power plants, and most other radioactive materials not managed as part of the current waste-management system, will not be generated until well into the future. There will be sufficient time to modify the current programs and plans after the amount of additional waste to be generated by new plants is known. For example, the uppermost projection of new nuclear power plant operation would result in 35 percent more spent nuclear fuel by 2030 than provided for in current plans. Most of this increase would occur between 2020 and 2030, leaving ample time to make program adjustments.

Flexibility has been built into the current programs and plans. The system-development process, the waste-acceptance process, and the cost-estimating and cost-recovery programs can be adjusted to changing demands on the waste-management system. Evaluation of potential additional waste that may be generated after Oct. 24, 1992, indicates that any need for increased storage or disposal capacity can be handled by the current program planning process.

Development of the waste-management system is at an early stage, allowing ample opportunity to accommodate changing needs. Major facilities for storage, transportation and disposal have not been sited, and final designs for their construction have not been developed. Therefore, the system can be adjusted to meet new requirements.

The requirement for additional disposal capacity to handle increased quantities of nuclear waste does not necessarily mean that additional repositories will be needed.

Public hearings on Adequacy of Management Plans for the Future Generation of Spent Nuclear Fuel and High-Level Radioactive Waste, June 1993, will be held in Las Vegas, July 20 and Washington, D.C., July 29. For copies of the report, or to submit comments (due Aug. 20), contact: Dwight Shelor, Associate Director, Office of Systems and Compliance, Office of Civilian Radioactive Waste Management, DOE, 1000 Independence Ave., SW, Washington, DC 20585, (202) 586-6046.

Record -103

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01883619 DECISION ON PALISADES' VSC-24 CASKS GOES TO APPEALS COURT Nuclear Waste News May 13, 1993 V. 13 NO. 19 ISSN: 0276-2897 WORD COUNT: 208

As Palisades nuclear plant loads spent fuel into two temporary storage casks, the Michigan Attorney General's suit calling for a temporary restraining order transfers to the 6th U.S. Circuit Court of Appeals.

U.S. District Judge Robert Holmes Bell, who said he did not have the jurisdiction to hear the challenge, sent the case to the higher court. Bell dismissed the request to block Palisades from loading the casks, which the Nuclear Regulatory Commission (NRC) approved by its May 3 Certificate of Compliance.

The state attorney general, in conjunction with three private landowners and the environmental group Lake Michigan Federation, is requesting a temporary restraining order and a permanent injunction against use of the VSC-24 ventilated concrete dry storage casks (NWN, May 6). The plaintiffs want Palisades, owned by Consumers Power Co., to provide an environmental impact statement.

But Palisades already has loaded one of the casks and plans to begin loading the second in the next few days, Consumer Power Co. spokesperson Charles MacInnis said. Palisades is on schedule to complete the loading in time for June's refueling.

Office of Attorney General spokesperson Marion Gorton said Palisades may be forced to unload the casks if the court rules against them. "I would presume a judge could order them (Palisades) to unload the casks."

Record -104

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01880307 MICHIGAN ATTORNEY
GENERAL SUES NRC TO STOP PALISADES DRY STORAGE Nuclear Waste News May 06,
1993 V. 13 NO. 18 ISSN: 0276-2897 WORD COUNT: 356

The Michigan Attorney General's Office announced May 4 that it plans to sue the Nuclear Regulatory Commission (NRC) for approving the Palisades nuclear plant's use of a ventilated storage cask, spokesman Chris DeWitt said.

Attorney General Frank Kelley and three plaintiffs who own property near Palisades are seeking a temporary restraining order and a permanent injunction against use of VSC-24 ventilated concrete dry storage casks, approved by the NRC April 7 (NWN, April 8).

The Consumer Power Co. plant plans to begin loading the first VSC-24 with spent fuel rods May 7, pending a May 6 decision in the U. S. District Court for Western Michigan.

Management at Palisades was expecting such an action, plant general manager James Rang said. "We're still planning to load the casks on Friday."

Lakeside Weather

But Kelly hopes to stop the process, arguing the cask system has not been subjected to tests and has not been proved to withstand the climatic conditions of the Lake Michigan shoreline, which is 150 yards away from the storage site.

"It is extremely important that these high-level radioactive wastes be kept in the containment building until an environmental impact statement is completed and until we know that this is the best possible plan for stopping some of the world's most dangerous substances. Unfortunately, it appears that the NRC has chosen to ignore that fact that the required environmental studies have not been done," said Kelly.

However, Palisades is equipped to deal with the casks, said Consumer Power spokesman Charles MacInnis. "In reality, the plant has been sitting there 20 years, so we have 20 years of experience monitoring the environment there."

If the restraining order is granted, Palisades will face a storage shortage. The fuel pool is almost full: 738 fuel assemblies already have been placed in the pool, which has space for 772. The plant faces a refueling outage and 10 year inspection in 1994.

Palisades has been waiting three years to use the cask since its 1990 application for a license to use the VSC-24. During the past three years, NRC issued a safety evaluation report, prepared an environmental assessment and resolved over 230 written comments over two separate public comment periods.

While the Nevada Nuclear Waste Policy Office (NWPO) is publicizing its transportation study to muster opposition for the interstate transport of high-level radioactive waste to the pro-posed Yucca Mountain repository, the American Nuclear Energy Council (ANEC) is fighting back.

"It makes little sense to designate routes for shipment of nuclear waste since the Department of Energy's site characterization efforts are expected to continue another seven to 10 years. At this time, we don't know whether Yucca Mountain will be a suitable repository site," said American Nuclear Energy Council president Edward Davis, adding that, if selected, the site will not open until 2010, leaving 17 years to determine transportation routes.

But a study produced by the NWPO disagrees with this assessment. The study, to be released June 9, details potential highway and railway routes and estimates what percent of waste would travel across them.

Midwest Crossroads

More than 80 percent of nuclear waste is generated east of the Mississippi River, said Bob Halstead, director the study. Approximately 40 percent of waste would come through Illinois on Interstate 80 while about 40 percent would come through St. Louis from the Southeast and Mid Atlantic states and 18 percent would come from the West and Southwest, Halstead said.

"Every American is a Nevadan when it comes to the disposal of radioactive waste," NWPO public affairs manager Dennis Baughman said. "The affected cities will be very interested to learn the roles they may be forced to play in the transportation of nuclear waste."

"The Yucca Mountain site is one of the worst places in the country for a nuclear waste facility, as far as transportation is concerned," Halstead said. "Highway access is poor, the nearest railroad is more than 100 miles away, and its distant location from eastern storage sites means more miles of cross-country shipments and greater transportation risks nationwide."

But the nuclear energy industry has one of the safest transport Records, according to a report from the U.S. Council for Energy Awareness (USCEA). Exactly 2,552 of the 35 million packages of radioactive material transported between 1971 and 1985 were involved in accidents. Of these, 67 packages failed, but they did not release enough radioactivity to present a public hazard.

Still, Halstead said the DOE needs to make a commitment to full-scale physical testing of cask prototypes prior to the Nuclear Regulatory Commission's (NRC) certification, including sequential testing using the drop, fire, puncture and immersion tests.

"That's premature," said Ted Garrish of ANEC, adding that the casks that will be used have not been developed. All licensed casks have undergone vigorous tests, Garrish said.

These tests on high-level waste casks have included the four tests mentioned by Halstead in addition an 80 mph truck crash into a 700 ton concrete wall and a crash with a 120 ton locomotive traveling at 80 mph.

But transporting waste across the country could also prove costly, said Halstead, citing the 1992 court award of nearly \$500,000 to a couple whose home ran along a hazardous waste transport route.

Public Perceptions

In *City of Santa Fe v. Komis*, the New Mexico Supreme Court upheld a lower court decision to award the money on the basis of perceived loss due to public perception of fear. The property was next to a highway bypass used to transport hazardous nuclear waste from Los Alamos to the Waste Isolation Pilot Project near Carlsbad.

And property values do not take into account the cost of accidents, Halstead said. The analysis does not account for human error or include results of post-accident cleanup involving only fractional releases of cask contents.

A 1990 report estimated cleanup costs could range from \$176 million to \$19.4 billion. According to NWPO, the DOE should research transportation with regard to human factors analysis and accident probabilities.

However, concern over accidents did not lead Nevada to stop the dozens of shipments of spent fuel through the state, Davis said. Most of these shipments included waste taken out of Nevada to Idaho

National Engineering lab, said Halstead, adding that DOE should maximize overall waste system reliance on rail shipments. He said Nevada lacks the necessary rail transport, which will be expensive to build.

But rail construction costs fall between \$1.0 and \$1.5 billion, approximately between 3 and 5 percent of the \$31 billion cost of characterization and construction at Yucca Mountain, Garrish said.

And concerns over the method of transport are premature at this stage of the process, Nevada Assemblyman Jack Regan said. "To put it simply, the routes which will be used to transport waste cannot be determined until a repository site is studied, approved and licensed."

Citing the need to begin transport studies, so that the public can participate as stakeholders, Halstead made four demands of DOE: that it complete its study by 1993, that it provide localities along possible transport routes with assistance under Section 180(c) of the 1987 NWPAA, that it release a draft comprehensive report by April, 1994, and that it allow six months for dialogue following the review of that report.

Record -106

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01869248 NRC APPROVES VENTILATED SPENT FUEL STORAGE CASK Nuclear Waste News April 08, 1993 V. 13 NO. 14 ISSN: 0276-2897 WORD COUNT: 466

Consumers Power Co.'s Palisades nuclear plant near Kalamazoo, Mich., finally will be able to use temporary dry storage of spent fuel after the Nuclear Regulatory Commission (NRC) approved the ventilated concrete storage containers April 2.

Thirty days after the NRC's April 7 announcement in the Federal Register, Palisades can begin to use the VSC-24 ventilated storage casks, designed by Pacific Sierra Nuclear Associates.

The VSC-24 outshines all alternatives, said Palisades public affairs director Mark Savage, explaining that the casks provide additional shielding, facilitate the storage process and save money. \$500,000 Per Container

At \$500,000 per container, VSC-24 surpasses all-metal alternatives costing between \$3 million and \$5 million, Savage said. The VSC-24 saves money because the concrete casks can be constructed on-site. Consumer Power has not decided whether this savings will be reflected in customer rates.

The casks, which hold 24 fuel assemblies, have a 2-inch thick internal steel canister. This canister fits inside a ventilated cask lined with 1.5 inches of steel and 29 inches of concrete. The casks permit ventilation as four 1-foot holes allow the entrance of cool air at the bottom while vents dispense warm air at the top. The canister is 16.5 feet tall and 11 feet in diameter and weighs 130 tons when fully loaded.

Casks Do Not Replace A Repository

But the storage casks are not an alternative to the siting of a permanent waste disposal facility at Yucca Mountain. Consumer Power is urging the Department of Energy to continue the siting process, Savage said.

"We would prefer to send the plant's spent fuel to a centralized permanent storage facility operated by the U.S. Department of Energy. But since no such repository has yet been built, this temporary measure is the safest solution available," said David Hoffman, Consumer Power's vice president of nuclear operations.

NRC's approval came just in time. The fuel pool is almost full; 738 fuel assemblies have already been placed in the pool, which has space for 772. The plant faces a refueling outage and 10-year inspection in 1994. Eight of the total 25 casks under contract are now in place for storage.

Palisades will not be the only plant to benefit from NRC's decision. Both Wisconsin Electric Power at Point Beach and Entergy's Arkansas Nuclear Plant plan to use the VSC-24, Savage said.

A time-consuming process hampered NRC's approval. Consumer Powers applied for the license March 12, 1990. During the next three years, NRC issued a safety evaluation report, prepared an environmental assessment, and resolved more than 230 written comments submitted during two separate public comment periods. Michigan also has conducted numerous public hearings since 1989. Without NRC's approval, "We would have had no place to off-load spent fuel and we would probably have shut the plant down in the next year or two," said Charles MacInnis, director of news information for Consumer Power. "The alternatives were not desirable."

In the past, governments tried to site nuclear waste facilities by a process described as "Decide, Announce, Defend." The theme of the opening session of this week's Waste Management '93 in Tucson, Ariz., was simply: The old system is dead. Not even the most centralized government can force a nuclear waste facility on a local population determined to oppose it.

U.S. Nuclear Waste Negotiator David Leroy, who has been given the task of finding a volunteer host for a monitored retrievable storage facility for spent fuel, described the new order in a presentation he called "Nuclear Waste 101."

Five Rules

Leroy's five rules for approaching waste facility siting are:

- 1.) NIMBY (Not In My Back Yard) Is Not A Four-Letter Word: Instead, it is a natural, normal, pervasive human reaction to a facility that concerns people.
- 2.) Nuclear Fear = Nuclear Near: People are most afraid of nuclear facilities when they are close at hand. However, the reality is the lack of storage and disposal facilities have brought nuclear waste nearer to more people, rather than fewer. Nuclear waste is being accumulated and stored for long periods of time at facilities never intended for the purpose. While the United States wrestles with the question of an MRS, at least 75 de facto MRSs are developing around the nation at nuclear power plants. Thousands of low-level waste generators - from nuclear power plants to local hospitals - are becoming temporary low-level waste storage depots because they have nowhere to ship waste. Hundreds of defense sites and Department of Energy nuclear weapons plants have stored waste under conditions never intended to be permanent.
- 3.) Public Involvement is Not Just Noble, It is Necessary: In the New World Order, public accommodation and involvement are considered normal. The only way to accomplish an unpopular task such as siting a nuclear waste facility is to get some portion of the public on your side.
- 4.) The Natives Are Restless: People mistrust the authorities and do not want to be burdened with nuclear waste. However, this does not mean a situation cannot be created where some people accept nuclear waste.
- 5.) It's Time for Heroes: Solutions will require formal and informal leaders.

Leroy pointed to his own office as the world leader in the practical discipline of voluntary siting. The United States is closer to an MRS now than at any time since 1985, when the Department of Energy lost Gov. Lamar Alexander's support for an MRS in Tennessee. On Leroy's watch, 20 states, Indian tribes and local governments have applied for grants to study the possibility of siting an MRS; 10 are still active in the program.

Government consistency is a key requirement for a successful volunteer siting process, Leroy said. It is not possible to win the cooperation of reluctant volunteers unless they know the national priority will not change. 'Commit to MRS Now'

Leroy called on the attendants to commit themselves and their organizations to an MRS - now. "Don't dally and rethink it" or wait to feel out where the Clinton Administration stands, just get behind the program, he said. He also called on attendants to support the voluntary process, adding the voluntary effort will not be over "until one jurisdiction says 'yes'; all jurisdictions say 'no'; or Congress tires of counting the yeses and nos."

The French government selected its own nuclear waste negotiator last December, said Jean Pierre Giraud from Cogema, the French spent fuel processing company. France, like the United States, experienced difficulties in having the government designate a waste disposal site. Legislation passed in 1991 set up a new process designed to produce a volunteer site. Giraud, like Leroy, described the volunteer process as the wave of the future for nuclear stations around the world.

Paul Grimm, acting assistant secretary of energy for environmental restoration and waste management, told the March 1 gathering the whole world is watching to see how the department handles cleanup of its old nuclear weapons production sites.

A Window of Opportunity

The growing budget for DOE's cleanup offers a window of opportunity for development of new technologies, techniques for beginning remedial action sooner than planned and developing ways of reducing future waste generation - including generation of wastes from the cleanups themselves. Public confidence is critical to the success of the cleanup program. At a time when people in the United States are being asked to make sacrifices to reduce the federal deficit, the Department of Energy must prove it is neither wasteful nor sloppy in the use of its growing waste budget, Grimm said. The department must improve its cost-control efforts and be scrupulously self-critical in its reviews. In cleanup of its own sites as well as in the civilian waste program, DOE must forge partnerships with stakeholders and give them a role in the decision-making process, Grimm said.

The Department of Energy's integral monitored retrievable storage (MRS) nuclear waste disposal plan should be abandoned because it is no longer feasible, a Louisiana State University researcher said.

Rather than pursue an ill-fated MRS policy, the government should make arrangements for cost-sharing or subsidize expenses for on-site storage of nuclear wastes, said Allan Pulsipher, director of the Policy Analysis Program at LSU's Center for Energy Studies. In addition to being more politically feasible, on-site storage is not as costly as the MRS option, he said. "Some people aren't going to be happy about it, but it doesn't involve moving the spent fuel to a new location."

Siting Delays Make MRS Unworkable

Delays in siting a nuclear waste repository make the establishment of an MRS facility essentially unworkable, Pulsipher said. When the MRS proposal was developed in the mid-1980s, the federal government's Nuclear Regulatory Commission estimated construction of a waste repository would be completed by 2003. That target has been pushed back to at least 2010, forcing the government to rely on unsatisfactory, short-term storage options, Pulsipher told NWN.

"The time scale is so long before the repository may come on line that nuclear power plants may reach the end of their operating life before there is a repository" where spent fuel may be deposited, he said.

Even under the most optimistic scenario, the MRS plan as crafted would leave the country with a huge nuclear waste disposal problem, Pulsipher added. The government hopes to begin temporary storage of spent fuel in 1998, a target few believe will be met.

Even so, most utilities would have to continue storing waste on-site because nuclear reactors annually discharge from their core into spent storage pools about 2,000 metric tons of uranium (MTUs). But the government plans to accept only 400 MTUs of waste annually. This would increase to 800 MTUs in 2010 when the repository opens, and eventually to 3,000 MTUs, Pulsipher said.

Politics, Opposition Damage MRS

The likelihood of DOE's successful implementation of an MRS plan also has been damaged by political and public opposition to the proposed siting of nuclear waste storage facilities, Pulsipher wrote in a paper presented last month at a Washington, D.C., seminar by Resources for the Future, a think-tank.

Concerns about DOE's reputation in academic and political circles also have dimmed the prospects of MRS working, Pulsipher said.

"DOE's competence, direction and need for existence have been questioned almost since its inception. Given that atmosphere, it's not really surprising they've been reticent to let go of this idea for the MRS."

Scientists have not been the only critics of the proposed MRS option. Some environmental groups have assailed the plan for a host of reasons. Environmentalists worry about temporary storage of nuclear waste not because of safety or health risks, but because of concerns about intergenerational equity, Pulsipher said.

"Their fundamental driving moral precept is to make sure that the generation that enjoyed the benefits of electricity generated with nuclear power or (enjoyed the) deterrents of (nuclear) bombs bear all the costs and responsibility of permanent disposal and don't pass them on to future generations."

DOE should accept that interim storage is not a politically viable option and should speed the licensing and operation of a permanent waste repository, Pulsipher said. The Department also should ensure that nuclear waste is stored at reactor sites in a safe and efficient way.

While chief economist for the Tennessee Valley Authority in the late 1980s, Pulsipher found it is cheaper to keep spent nuclear fuel on-site rather than ship it to an MRS. DOE officials also have raised doubts about the plan.

Former Energy Secretary James Watkins said he was not optimistic that a large-scale traditional MRS is feasible.

MRS is a "good idea" whose time has passed, Pulsipher wrote in the paper. "It's not that the (MRS) plan was wrong," he told NWN. "It had a lot of good characteristics, but the facts have changed ... and DOE has not been proactive adjusting to those facts."

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01802657 SHOREHAM AVOIDS EXECUTIVE SQUABBLE BY GIVING SPENT FUEL TO PENN. Nuclear Waste News March 04, 1993 V. 13 NO. 9 ISSN: 0276-2897 WORD COUNT: 549

Although the Long Island Power Authority has finally managed to unload its slightly irradiated fuel rods from its Shoreham power plant, the owners of the \$5.5-billion dormant facility are not entirely satisfied. LIPA will pay General Electric and the Pennsylvania Electric Co. (PECO) \$65 million to transport 560 fuel assemblies from the Shoreham plant in New York to the Limerick plant, 35 miles northwest of Philadelphia. LIPA originally intended to send the fuel to France for reprocessing, at an estimated cost of about \$80 million.

"We're pleased that we have an alternative to remove the fuel from the Shoreham site," said Les Hill, resident manager for the LIPA plant that operated for 30 hours before shutting down. However, "there's a large measure of disappointment, bordering on outrage."

That disappointment stems from the last minute problems that erupted over LIPA's previous plans for disposal of the assemblies. Transnuclear of New York was going to ship the fuel to France for LIPA, but needed a permit from the Nuclear Regulatory Commission. The NRC, in turn, needed approval from the executive branch for the export license.

DOD Denies Permit Support

The license process moved smoothly until December when the Department of Defense denied any support for the permit, citing proliferation concerns and contradicting the position of the State Department and the Bush White House. The NRC waited for the issue to be resolved in the executive branch, which did not happen before President Bush left office. President Clinton has not made any decision on the matter yet, either.

Although Transnuclear has not withdrawn its application for the permit, the new agreement between LIPA and GE and PECO appears to be destined for completion. Rate payers for both utilities will feel the financial impact of that deal.

"The ultimate source of funding for this is the rate payers," Hill said, although he noted that reprocessing also would have been expensive. "Financially speaking, I think this option on paper is a little less costly."

PECO officials said they were pleased with the deal. "Not only does the company get \$45 million for taking the fuel, our customers will be saved \$70 million over a dozen years," said Bill Jones, a PECO spokesman.

Jones said the fuel has a commercial value of \$70 million, and is enough to supply the two 1,055 megawatt boiled water reactors at Limerick for 12 years. Because Shoreham and the Limerick plants are identical, PECO will be able to use the fuel immediately.

In addition to the \$45 million to PECO for taking the fuel, LIPA will pay GE \$20 million to transport the assemblies by rail. Shipments should begin in June. The full transfer will be completed by February 1994 because only 17 of the 560 rods will be sent at a time. The rods will be shipped in 70-ton vessels. Although the deal may be complete between the utilities, the NRC still has the final word. "They (PECO) have to have a license amendment for acceptance and use of the fuel. In addition to that, we have to approve the shipping cask and route of transportation," said Bob Newlin, a spokesman for the NRC.

PECO has not yet submitted an amended license, he said. "It's a little early for that at this point," Newlin said. Jones said PECO is already working on the license and GE is working on the route.

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01802653 2010 DEADLINE FOR YUCCA MT. UNREALISTIC, NWTRB REPORTS Nuclear Waste News March 04, 1993 V. 13 NO. 9 ISSN: 0276-2897 WORD COUNT: 382

The Department of Energy (DOE) could be making a costly mistake by setting a 2010 deadline for the opening of the Yucca Mountain spent fuel repository, a March 2 report from the Nuclear Waste Technical Review Board (NWTRB) says.

The DOE should set flexible deadlines, says the NWTRB Special Report to Congress and the Secretary of Energy, produced by the independent agency evaluating DOE's program to manage spent fuel and high-level defense waste disposal.

The report also proposed an independent evaluation of the management of the Office of Civilian Radioactive Waste Management (OCRWM) and urged DOE to develop a comprehensive management plan for high-level radioactive waste from generation to disposal.

Date Drives Experiments

"Its fixing a date that drives the way the experiments are planned that short changes getting an adequate data set," NWTRB Chairman John Cantlon said. He added that similar European designs for repositories were not scheduled to operate until 2020, a more realistic date.

But DOE has not left enough room in the schedule to accommodate "technical or institutional uncertainties," Cantlon said. Interim goals, such as tunneling to the repository area and building an exploratory studies facility to conduct experiments, could take a decade to complete and the application process could take an additional three years. DOE plans the applications to be authorized for construction by 2001.

The report also urged DOE to develop a generation-to-disposal management system, which should incorporate a plan for interim storage until a repository can be constructed. "That's the reason we were critical of the DOE and the initial system - that it wasn't put together and thought and argued through as a total system," Dr. Cantlon said.

A multipurpose container, used to store, transport and dispose of spent fuel, also makes sense, Cantlon said. Minimizing the number of times and places the waste is handled reduces the chances of human error or equipment failure.

By proposing an independent evaluation of OCRWM, which operates under the DOE, NWTRB hopes to eliminate funding problems, Cantlon said.

Overhead and infrastructure expenses account for 56 percent of its 1993 funding, leaving less than half of its funding for testing and research.

The NWTRB report is one of two released annually to evaluate DOE programs. To get a copy of the report, send \$2.50 from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 or call (202) 783-3238.

Record -111

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01768834 UTILITY CONSORTIUM
PROPOSES UNIVERSAL SF CONTAINER Nuclear Waste News January 28, 1993 V. 13 NO. 4
ISSN: 0276-2897 WORD COUNT: 373

A consortium of utilities led by Virginia Power submitted a formal proposal to the Department of Energy Jan. 28 for development of a universal container system for spent nuclear fuel.

"This universal container system proposal can improve disposal efficiency, reduce cost, enhance safety and ensure jobs," said William Stewart, VP senior vice president-nuclear. "We believe development of the universal container is an integral component of the nation's nuclear waste management system.

Other members of the consortium are Westinghouse Electric Corp., which will design the containers and overpacks, and Newport News Shipbuilding, one of the nation's leading shipbuilders, which will build the first containers. Newport News says expects the proposal to employ a significant number of workers displaced by the drop in defense-related contracts. Development of a multi-purpose standardized container system

was one of two key elements identified by former Energy Secretary James Watkins in his late December interim spent fuel storage strategy (NWN, Dec. 31, 1992, p. 471). VP's proposal calls for development of a steel inner container

that would be loaded only once, reducing radiation exposure to workers. This container then would be placed into a storage or reusable stainless steel transportation overpack. The universal containers in their transportation overpacks

could be shipped to federal sites by rail.

Funding for development of the containers would come from the federal Nuclear Waste Fund.

Other specifics of the proposal are:

Three-phase development conducted over five years. Phase I, projected to cost \$7.7 million, would cover all design and development efforts. Phase II would cover licensing by the Nuclear Regulatory Commission, fabrication of six prototypes for testing in national laboratories and four or more containers for a demonstration project at a nuclear station.

Phase III would cover delivery of the first 60 production models of the inner metal universal containers to DOE in 1998 for delivery to utilities. This would allow DOE to provide for spent fuel disposal even if a federal interim storage site is not available, the VP proposal said.

An advisory panel composed of scientists, government officials, civic leaders and special interest groups would meet periodically to review the project and provide for public participation.

The proposal projects a need for 10,000 universal containers for the U.S. nuclear power industry, at a cost of about \$600,000 each or \$200 million annually for 30 years.

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01768833 ATOMIC ENERGY CONTROL BOARD OKAYS PICKERING DRY STORAGE Nuclear Waste News January 28, 1993 V. 13 NO. 4 ISSN: 0276-2897 WORD COUNT: 402

Canada's Atomic Energy Control Board granted Ontario Hydro a construction license Jan. 22 for a dry spent fuel storage facility at the Pickering Nuclear Generating Station east of Toronto.

The facility, which will be built in phases, will store all spent fuel from the eight-unit station until the end of its operating life.

Ontario Hydro designed dual-purpose containers for the facility which can be used for both storage and transport of spent fuel. Each of the steel and heavy concrete dry storage containers (DSCs) has a 10 Mg payload capacity.

Ontario Hydro proposed the container development program in 1981 and has been testing prototypes loaded with spent fuel since 1988. Two DSCs were tested with six- and ten-year-old fuel.

The utility also is researching eventual use of the containers to transport spent fuel to a permanent disposal site. The DSCs are designed to meet International Atomic Energy Agency rules for Type B(U) containers. A five-year program was carried out to develop concrete mixes, mathematical models of impact deformation, impact limiter design codes and physical drop and fire tests.

One-quarter- and one-eighth-scale models were filled with heavy aggregate, loaded with simulated spent fuel, fitted with impact limiters and subjected to the full IAEA drop tests.

Use At Other Plants Studied

The dry storage technology is being studied for use at other nuclear facilities and will be part of the submissions to the federal environmental review on storage now underway.

Natural uranium dioxide CANDU fuel from Ontario Hydro's reactors is small, has low-burnup and generates little residual heat, said P.D. Stevens-Guille, manager of Radioactive Materials Management Engineering. This allows storage in compact casks without criticality problems. The dry storage containers consist of inner and outer steel shells filled with reinforced heavy concrete. Each container can hold 384 CANDU fuel bundles (approximately 8.8 metric tons of fuel) contained in four modules.

Containers can be wet-loaded in one shift in the existing fuel pools, then transported to a nearby welding shop where lids are attached. After weld radiography and leak testing, a custom-designed stacking vehicle moves the containers to the 7,000-square-meter storage building.

The first storage building will be adequate for all fuel generated through 2006. After that, a second storage building will be needed.

Liquid waste from the welding shop or storage area will be collected and treated in Pickering's active liquid waste system.

Contact: P.D. Stevens-Guille, Manager, Radioactive Materials Management Engineering, Nuclear Support Services, Ontario Hydro, 700 University Ave., Toronto, Ontario M5G 1X6, (416) 592-6024, fax: (416) 592-4485.

Record -113

DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01764888 MPC'S PERFECT COMPANION TO FUTURE MRS SYSTEM Nuclear Waste News January 21, 1993 V. 13 NO. 3 ISSN: 0276-2897 WORD COUNT: 430

Multi-purpose canisters (MPC) appear the most promising means of storing high-level nuclear waste in a monitored retrievable storage (MRS) system, according to the Department of Energy.

"We believe the maximum benefit of using the canister system, if we use the big ones, is it results in 100 percent clean MRS and standardization for on-site storage," said Jeff Williams from the DOE's Office of Civilian Radioactive Waste Management (OCRWM). Williams' report, MRS Program Status and Results of the Multi-Purpose Canister Study, was presented at the INMN Spent Fuel Management Seminar X in Washington, D.C. Jan. 14.

Six different concepts of an MRS were studied by the DOE, Williams said during his brief status report. Five of the designs are compatible with a multi-purpose cask system, the last with wet storage. The concept design was completed last fall, he said.

Compatibility Questions

One impetus behind the MPC study were the concerns of the Nuclear Regulatory Commission and Department of Energy over the numerous types of existing licensed storage facilities. Both agencies have raised the question of compatibility, Williams said.

The OCRWM undertook the MPC study last October as a system analysis, Williams said. "It's not a design study." It focused on existing technology rather than concepts that have not been explored before.

Williams defined the MPC in simple terms: "You have a canister that's sealed and holds multiple assemblies." The most important thing to remember about the canisters is that they will have to pass numerous NRC regulations, he said.

Three design concepts of MPCs were studied: large, small and thick-walled or universal. "After we developed the concept, we tried to evaluate how they would work in the system," Williams explained. The study gave the highest marks to the large MPC system.

An all-large MPC system would result in the lowest levels total occupational and public radiation exposure. Exposure estimates include handling during shipping and storage. The highest exposures would result from an all-small MPC system.

As far as cost estimates, an all-large system is the least expensive to run, compared to other MPC options. In fact, Williams said, the study revealed an all-large MPC system could potentially save \$1 billion in operating costs over other systems.

"We believe we can have this ready for deployment at reactors by 1997," Williams said. He expects the transportation aspects of the system to be ready by the end of next year.

Williams cautioned, however, that for the MPC system to work to its best potential, it must be universal. "If only a few utilities choose to work with this, basically we have another waste form," he said. "The more you use this, the better it gets."

The Department of Energy is investigating an alternative disposal program strategy under which the Nuclear Regulatory Commission periodically would make formal findings of the environmental safety of the proposed repository program as DOE proceeds with testing and data analysis. The proposed phased licensing approach was described in a Jan. 12 letter and accompanying statement to Senate Energy Committee Chairman J. Bennett Johnston (D).

The new strategy would replace the present strategy in which "the only official findings concerning disposal safety occur at the end of the NRC licensing process, and these findings would be based on performance assessment models and predictions without any experimental evidence of disposal safety," the statement said. Under the current system, the single, final licensing decision comes after 30 years and \$9 billion have been spent on site investigations, licensing and construction.

The new strategy would focus DOE's repository program activities on "those that are essential to resolve disposal safety issues." The program would be technically linked to the new spent nuclear fuel interim storage and transport programs Watkins described in a Dec. 17, 1992 letter to Johnston (NWN, Dec. 31, 1992).

Waste Tests Possible

Limited quantities of waste could be placed in the repository for tests to obtain experimental data to serve as the basis for NRC's licensing findings.

The strategy would provide for "abandonment of the Yucca Mountain site and retrieval of the test waste at any time if there are findings that safe disposal at the site is not possible," Watkins' strategy statement said.

The only way the proposed strategy can be implemented is through an NRC rulemaking, Watkins' statement acknowledged.

DOE expects to complete its investigations and provide a conceptual revised strategy for public review by April 1, 1993, Watkins said, adding that a "petition for proposed rulemaking will be submitted to the NRC if required."

The 1992 Energy Policy Act required the National Academy of Sciences to perform studies and make recommendations for the Environmental Protection Agency's safety standards for high-level nuclear waste and spent fuel disposal. EPA then will develop the standards, and NRC will revise its regulations to incorporate the EPA standards.

"As permitted by NAS, EPA and NRC procedures, DOE will participate in these proceedings to help assure that the standards are soundly based and appropriately structured for implementation," Watkins said. DOE also expects to perform technical analyses, prepare topical reports and comment on proposed regulations.

Cost Controls Put In Place

DOE has begun implementation of a cost-controlling iterative process, "which will operate under formal change procedures with the NRC, to revise and focus planned site characterization work on the basis of data already obtained," said Watkins.

The first revisions of the Yucca Mountain site characterization plan will be completed in May 1993 and will be based on interpretation of site data and the repository system safety performance assessment completed in July 1992.

The department has instituted practices to help assure management effectiveness, such as self assessment and assessments by independent parties. It is trying to improve work efficiency and cost effectiveness by such practices as optimization of drilling schedules and stringent adherence to procurement schedules.

As required by Section 803 of the Energy Policy Act of 1992, DOE is evaluating the adequacy of existing nuclear waste management plans and programs, considering additional waste that might be generated by new nuclear power plants or renewal of existing plant licenses, and "considering the potential impact of changes in the nation's defense posture and of new waste management technologies," Watkins said. A draft report of this evaluation will be available in May.

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01740367 NO ONE KNOWS HOW WASTE PROGRAM WILL FARE UNDER CLINTON, INMM TOLD Nuclear Waste News January 14, 1993 V. 13 NO. 2 ISSN: 0276-2897 WORD COUNT: 1006 .

The high-level radioactive waste program would probably be best served by keeping a low profile during the first session of the 103rd Congress, Senate Energy Committee staffer Mary Louise Wagner told a spent fuel management seminar Jan. 13. She and other speakers stressed the new administration, and the new Congress, bring many unknowns to the troubled program.

The Clinton administration is unlikely to want to make streamlining the high-level waste program one of its first major initiatives, she explained to the Institute of Nuclear Materials Management meeting in Washington, D.C. Don't clamor for major changes, just work for incremental changes where needed, she advised.

Wagner identified several issues, however, that could surface for debate in this session of Congress. Recommendations made by outgoing Energy Secretary James Watkins in letters to Senate Energy Committee Chairman J. Bennett Johnston (D-La.) Dec. 17 (NWN, Dec. 31, 1992, p. 471) and Jan. 12 (see story, p. 13) are among likely candidates for congressional debate.

Congress could decide to take up any of the following:

Perennial sparring over a Monitored Retrievable Storage (MRS) facility could go into another round in Congress, Wagner said. Watkins' Dec. 17 letter to Johnston called on DOE to plan to use one or more of its old nuclear weapons facilities for interim storage of civilian spent fuel. It's not clear that an MRS on a Energy Department facility would be any easier to site than one on a volunteer site, Wagner said.

Also, if the federal-facility MRS option is pursued, Congress is likely to have to decide whether to continue simultaneously with attempts to find a volunteer site. Among the questions: Should the Mescalero Apache tribe in New Mexico, the most advanced of the possible volunteers, be allowed to continue their studies? On the other hand, is Congress ready to debate the ramifications of siting an MRS on Indian lands?

Congress could be asked to determine what the 1998 commitment to accept spent fuel really means: How much fuel? Accepted from who? Should a universal cask option be pursued?

The decision on how the Environmental Protection Agency's high-level waste standard should be revamped could be thrown to Congress. Will a new EPA standard increase or decrease the cost of a repository? Last year, Congress was told the EPA standard was controlling the cost of a repository, Wagner said. Watkins, in his Dec. 12 letter to Johnston, referred to a \$9 billion repository, instead of the \$6 billion repository formerly projected, she said.

Would a different licensing strategy cut repository costs? Is a phased licensing approach proposed in Watkins' letter politically doable?

Budget Woes Continue

The biggest issue faced by Congress could be how to solve the budget problem, given that the Nuclear Waste Fund is "a hostage to the federal deficit," Wagner said. The program budget was the main issue of 1992. The \$3 billion in the waste fund is helping to offset the overall federal deficit, even though the money comes from the 1 mill per kilowatt hour fee paid by nuclear utilities. Changing this would require passing new legislation, which itself could violate the Deficit Reduction Act.

Wagner could not say whether a budget solution is "doable" at this time. "In times of trying to reduce the deficit, there is not going to be a lot of willingness (in Congress) to take a fund of this size off-budget." She cautioned that it is too early to predict what DOE, Congress or the White House will do. The waste program is on the brink of change, but it is not clear what kinds of change.

The Clinton administration will be the first Democratic administration to implement the high-level waste program set up in 1982. Congress has a high proportion of new members. DOE and EPA will be headed by new people. The only thing that can be said for certain is that "The (Clinton) administration is unquestionably in the driver's seat."

Get Underground in 1993

>From a technical standpoint, the principle focus of the repository program in 1993 will be to get underground at the Yucca Mountain, Nev., candidate repository site, said John Bartlett, outgoing director of DOE's Office of Civilian Radioactive Waste Management.

Bartlett called the exploratory shaft facility (ESF) "the holster for the gun" of site characterization - an access tool that makes possible collection of subsurface data.

The current schedule calls for DOE and its contractors to begin in April "drill and blast" excavation to a depth of 200 to 400 feet in preparation for use of a tunnel boring machine. The tunnel borer will be brought on site by the end of 1993, and boring will begin in February 1994. A request for proposals for a tunnel boring machine went out last month.

Robbie Robertson from TRW, the Yucca Mountain management and operating contractor, pointed out that oil contamination from the tunnel borer is a problem that remains to be solved. These machines typically introduce about a barrel of oil per day to a site, he said.

The earthquake that hit the Yucca Mountain area last June has been "a rich source of data," Bartlett said. It has accelerated seismic evaluation activities. The repository has the largest dedicated seismic network in the world, he pointed out.

Bartlett called most media reports of Watkins' Dec. 17, 1992, letter to Johnston outlining a new MRS strategy so much "baloney." Watkins did not say DOE could not make the 1998 date for receipt of spent fuel; but rather that the new federal site initiative was being set up to complement the negotiator's work to assure that the 1998 date could be met. "The negotiator's effort has not changed," Bartlett emphasized.

While there have been some hopeful signs in the last 18 months, Edison Electric Institute and the nuclear utility industry still are very concerned with repository program progress, Julie Jordan from EEI said. The attitude can best be summed up as: "DOE, you have our money and we have your waste."

More industry involvement in the waste program is a prerequisite to success, she said. The nuclear industry is looking at playing a proactive role in the program, but the nature of that role is not fully developed.

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DIALOG(R)File 636:IAC Newsletter DB(TM) (c) 1996 01740366 NEGOTIATE IN GOOD FAITH,
OR GO AWAY, MESCALEROS SAY Nuclear Waste News January 14, 1993 V. 13 NO. 2
ISSN: 0276-2897 WORD COUNT: 341 .

Mescalero tribal secretary Fred Peso called on the federal government to either get on with good faith negotiations for a voluntary host for a monitored retrievable storage (MRS) facility, or kill the Nuclear Waste Negotiator's office and go away. "Twisting in the wind is no fun," said the spokesman for the Apache tribe that has progressed furthest in the negotiated siting process.

The Mescaleros are "sincerely interested" in hosting an MRS, Peso said. "We are ready to talk," he told the 10th annual Institute for Nuclear Materials Management Spent Fuel Seminar in Washington, D.C., Jan. 13.

The MRS represents an opportunity for tribal self-sufficiency, he explained to the assembled nuclear experts. The Mescaleros cannot return to their independent nomadic past and they do not want to continue accepting rations or welfare from the U.S. government. "There is no dignity in eating at someone else's table."

Frustration Builds

Tribal officials are becoming increasingly frustrated with the way the federal government has handled the negotiated process, Peso emphasized. "We question whether the Department of Energy is committed to a voluntary process." First the tribe was told not to rock the boat until after the election, then they were told that nothing could be done until the Clinton transition team was in place. Finally, Watkins wrote his Dec. 17 letter calling for a new strategy to find an MRS site on one of DOE's own facilities.

"We wonder where the process is headed," Peso said. "Perhaps Congress only created the Negotiator's office to give the appearance of trying to solve the spent fuel storage problem. We hope not," Peso said.

Senate Energy Committee staffer Mary Louise Wagner responded that Congress, indeed, was very serious in 1987 in setting up the negotiated process, notwithstanding its skepticism. One of the difficulties, however, was including Indian tribes among those eligible to negotiate for the site, and then failing to address the issues that could come up in negotiating with a sovereign tribe.

"It's been political landmine after political landmine," she said, adding that she personally would like to see negotiations with the Mescaleros continue.

As the 1998 deadline looms for the government to take title of nuclear waste throughout the nation, discussion of different aspects of the transfer kept the Nuclear Waste Technical Review Board busy last week in Arlington, Va.

Under the foregone conclusion that no monitored retrievable storage (MRS) facility will be built by that year, other methods of storage and transportation are necessary. Topics at the board meeting ranged from interim storage to dual- and multi-purpose storage casks.

The problem with interim storage is not so much the cost and equipment, but the licensing process, said Robert Bernero, director of the Office of Nuclear Material Safety and Safeguards of the Nuclear Regulatory Commission. And because the process is so involved, it costs a great deal of money.

By 2000 an estimated 26 nuclear power plants will need some form of increased storage capacity, he said. Those licensed facilities have three options for interim storage: increase the capacity of the existing fuel pool; ship the fuel to other facilities; or build a national fuel storage facility, he said.

In addition to licensing, money and technology, there is at least one other issue, said John Bartlett of the DOE's Office of Civilian Radioactive Waste Management: "The issue is responsible management." A successful management strategy is necessary to spare future generations from an environmental nightmare, he said.

Disposal Options Needed

And there are other problems, as well. "At present, we don't know the Yucca mountain is suitable; we don't know where we're going. The system is at present open-ended," he said. Yucca Mountain's uncertainty belies the government's need for more storage options.

"The fundamental issue is not complexity, it's diversity," Bartlett said. In case one option should fail, there should be other choices available. Utilities are concerned that the lack of viable options will lead to more on-site storage of spent fuel, giving rise to higher utility rates for their customers.

If the Federal government does not accept the utilities spent nuclear fuel before 2010, there will continue to be roughly 70 unofficial temporary storage sites in the nation, said Lynn Shishido-Topel, of the National Association of Regulatory Utility Commissioners (NARUC). Shishido-Topel chairs the NARUC subcommittee on Nuclear Issues-Waste Disposal.

That will lead to a double payment for the ratepayers, she said: Once for the future permanent repository and MRS and again later through higher rates for additional on-site storage at the reactors.

On-site storage in anticipation of a permanent MRS led to a number of presentations concerning multi- and dual-use casks.

"I think the dual-purpose cask is one of the technologies that is about to be available," Bartlett said. Although the cask, which would be used for interim storage as well as transportation and then permanent storage has not been certified by the DOE, others agreed with Bartlett that they would be soon.

"It's quite foreseeable in the near future," Bernero agreed. That technology would store spent fuel safely and economically, he said.

In order to design the perfect multi-purpose cask, specific guidelines and philosophies for dry storage, transportation and minimizing radiation exposure need to be defined up front, said Thomas Sanders of the Sandia National Laboratories. Perhaps almost as important, "what we're talking about here is coming up with a design definition that can outlive regulatory instability" over the next 40 years, Sanders said. He noted regulations have changed drastically over the past 40 years from the time the Post Office regulated transportation.

Sandia has been studying the multi-purpose cask and "our goal is to try and define a normal condition of storage environment up front," Sanders said.

Deadlines Hamper MRS Site Search

As for as the MRS site search, progress has been slowed by the government's self-imposed and highly publicized 1998 deadline to assume storage responsibility for all spent fuel in the country, said Charles Lempesis of the Office of the Nuclear Waste Negotiator. The office is charged with the task of finding a volunteer state or American Indian reservation to house a storage facility.

"1998 would certainly be a goal," Lempesis said. "These deadlines are killing our opportunity for success. When we quit talking about 1998, we have a better shot at 1998 or 2008." He said the government simply needs to slow down and regain the public trust.

"In the last 10 years, trust in the federal government is at an all-time low," he said. That distrust is reinforced when the government appears to be in a hurry to accomplish something.

"Public confidence would be well-served if we demonstrated we're not in a hurry to get nowhere," he said. He said the volunteer program is working and that a site will be found. "But folks, you have a long way to go, so keep your pants on."